The earliest known Palaeozoic ensiferan insect from Africa, *Afroedischia oosthuizeni* gen. et sp. nov. (Orthoptera: Oedischiidae)

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An oedischiid orthopteran insect from the Lower Permian of southern Africa is described as *Afroedischia oosthuizeni* gen. et sp. nov. This is the only member of the family Oedischiidae known in the Southern Hemisphere, if *Proedischia* Pinto & Ornellas, 1978, of the Upper Carboniferous of Brazil, is correctly placed in a separate family Proedischiidae.

The fossil history and classification of the Orthoptera were recently discussed by Kukalová-Peck[1] and Carpenter.[2] Orthoptera date from the Carboniferous, about 300 million years ago. Two types of wing venation within the stem-group assemblage, represented by *Oedischia* and *Metoedischia* respectively, showing differences in the seemingly uniform orthopteroid venation, suggest that the Orthoptera is not monophyletic.[1]

Oedischiidae (Carboniferous – Triassic) are generally considered to be the most primitive of the known Orthoptera.[2] Of the 13 genera presently placed in the Oedischiidae,[2] *Oedischia* Brongniart and *Anhomalophlebia* Handlirsch are from the Upper Carboniferous of Europe, *Jasvia* Zalessky, *Macroedischia* Sharov, *Rimnosentomon* Zalessky, *Sylvoedischia* Sharov, *Tettoedischia* Sharov and *Uraloedischia* Sharov from the Permian of Asian Russia, *Metoedischia* Martynov and *Pruvostites* Zalessky from the Permian of European Russia, *Permoedischia* Kukalová and *Plesioidischia* Handlirsch from the Permian of Europe (the Czech Republic and Germany, respectively) and *Paroedischia* Carpenter from the Permian of the USA (Kansas). *Proedischia* Pinto & Ornellas, the type of the family Proedischiidae (Protorthoptera), has been described from the Upper Carboniferous of Brazil.[3,4] The Protorthoptera are currently considered to be an artificial or polyphyletic assemblage consisting of various Palaeozoic Neoptera, members of which are gradually being reassigned to other orders, including Orthoptera.[1,2,5] Proedischiidae is probably related to Oedischiidae.[2]

The earliest ensiferan Orthoptera (Tettigonioidea) described from South Africa is from the Upper Permian of KwaZulu-Natal, represented by *Protettavus exilis* Riek (Tettavidae).[6]

Here a new taxon is described from South Africa. Its nearest known relative appears to be *Oedischia* Brongniart, 1885, described from the Upper Carboniferous of France.

Description

***Afroedischia* gen. nov.** (Oedischiidae: Orthoptera), Figs 1, 2

Type species. Afroedischia oosthuizeni sp. nov., Laingsburg Formation (Karoo Sequence, Ecca Group), Lower Permian.

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Description. Afroedischia appears to be related to *Oedischia* as both possess a medial crossvein connecting the stem of the median anterior (MA) and median posterior (MP) with anterior cubital (CuA), the crossvein of *Afroedischia*, however, being more distinct. In *Afroedischia* the bifurcation of MA and MP is four-tenths the distance between the origin of radial sector (Rs) and the crossvein, whereas in *Oedischia* it is much closer to the crossvein. In *Oedischia* some veinlets in the region posterior to costa (C) are convoluted; all veinlets are straight or slightly curved in *Afroedischia*.

Etymology. Afroedischia: an oedischiid ensiferan grasshopper from Africa. Gender: masculine.

***Afroedischia oosthuizeni* sp. nov.**, Figs 1, 2

Holotype. Specimen K85 in collection of Roy Oosthuizen, Swartkrans, Prins Albert. This collection is being transferred to the South African Museum, Cape Town.

Geographical and stratigraphical distribution. The specimen is from 2 km west of Laingsburg, South Africa, Laingsburg Formation (Karoo Sequence, Ecca Group), Lower Permian; mudstone as is typical of this formation. Collected by a team of palaeontologists led by B. Oelofsen.

Description. Holotype forewing with tip missing, hind wing basal fragment. Length of forewing (incomplete) 42 mm. The convex curvature of the costal and anal regions shows the specimen to represent the dorsal surface of a somewhat tegmatized left forewing, base to the right (Figs 1, 2). The specimen is assumed to be on the upper surface of the matrix, although orientation of the slab is unknown. To agree with general custom, these figures are inverted towards the right.

Forewing: precostal area elongate-triangular, partially obscured basally by portion of hind wing, distal part with convex-oblique veinlets; C basally slightly flexed posteriorly for one-third distance from base, then almost straight along wing margin, thinning distally; subcosta (Sc) from base initially parallel to, then diverging from, then converging until almost parallel to C; region between Sc and C with oblique veinlets from precostal termination, veinlets becoming more curved and oblique towards wing apex, spacing between veinlets initially irregular but closer distally; radius (R) strongly positive (raised), curved, initially parallel to Sc, then diverging slightly so that R is parallel to costal margin, veinlets between diverging R and Sc short, oblique, and irregularly spaced; Rs from R at slightly more than twice the length of precostal area from wing base; median (M) first approximating, almost anastomosing with R, before diverging at same distance from wing base as apical precostal area; stem of MA and MP first parallel to R, forking slightly less than halfway between origin of Rs and apical precostal area; MA initially parallel with, then curving towards R, then diverging to outer wing margin; region anterior to M and MA with irregularly spaced, almost straight or slightly curved, veinlets, becoming oblique near Rs; MP diverging gradually from MA, veinlets between MA and MP oblique; CuA diverging from wing base, forming cell with basal stem M, at end of cell connected to prominent crossvein from M, diverging from stem of MA and MP, then parallel for some distance to MP, cell with veinlets distally extending anteriorly towards M and R, veinlets in region distal to crossvein and between CuA, M and MP slightly oblique near stem of MA and MP; CuA with four branches, first branch at twice the length of crossvein from end of median cell, second branch equidistant from first and third branch, fourth branch diverging in line with origin of Rs; posterior cubital (CuP) initially forked with CuA, almost straight, first parallel to CuA for length of cell, then slightly diverging to first branch of CuA, veinlets in

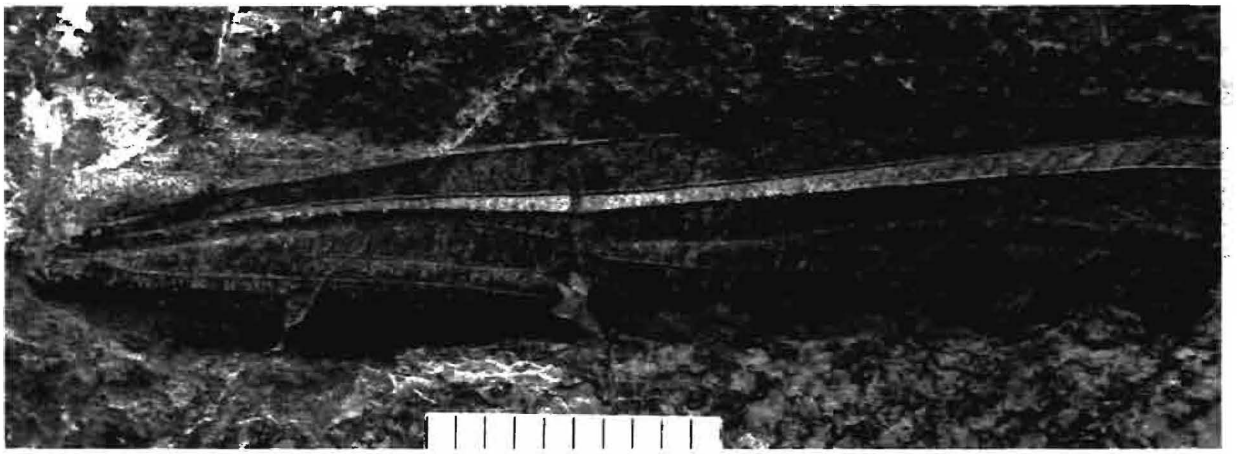

Fig. 1. *Afroedischia oosthuizeni* gen. et sp. nov., left forewing (inverted to right). No further detail beyond right margin of figure. Scale = 10 mm.

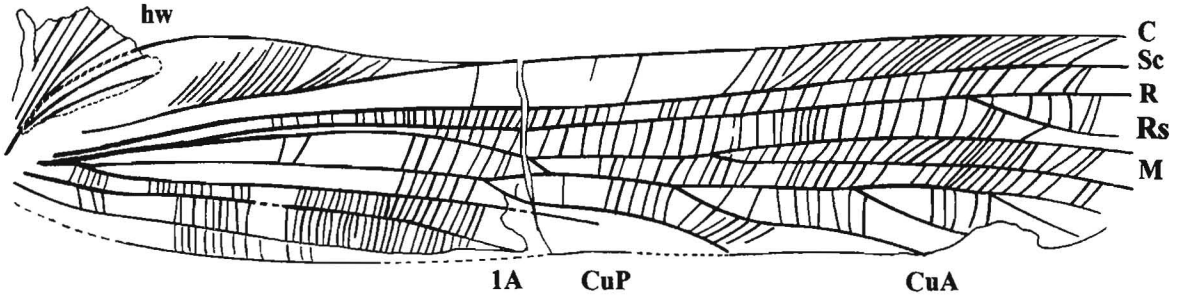

Fig. 2. *Afroedischia oosthuizeni* gen. et sp. nov., wing venation. hw = hind wing.

region anterior to CuP regularly spaced; first anal (1A) straight, initially parallel to, then diverging slightly from CuP to posterior wing margin, region between 1A and CuP with closely arranged veinlets; 2A distinct, curved from wing base, then almost straight towards posterior wing margin, veinlets anterior to 2A from base in line, especially distally, with those anterior to 1A, veinlets posterior to 2A irregular, in line with anterior ones.

Hind wing: fragment of basal region with diverging veins.

Remarks. The length of the incomplete forewing is 42 mm; if the position of the origin of Rs is as usual at half the wing length,[2] the complete wing would be at least 70 mm.

Etymology. This species is named for Roy Oosthuizen to honour his extensive contribution to palaeontology.

Discussion. Controversial features of the venation of fossil Orthoptera have been discussed by Kukalová-Peck[1] and Carpenter.[2] The usual topography of the costal (C), subcostal (Sc), radial (R) and posterior cubital (CuP) veins is present, but the branches of the radial sector (Rs), median (M) and anterior cubital (CuA) veins are usually flat or neutral in the forewing. In Oedischiidae MP is present as a strongly concave vein, and CuA is convex. MA is not distinctly convex in any known Orthoptera. By the nature of fossil material, diagnostic details are often missing, making comparison with modern genera difficult. Generic descriptions of oedischiid genera, including drawings of venational detail, have recently been summarized.[2] In *Anhomalophlebia* the forewing is as in *Oedischia* but relatively shorter and broader, MP unbranched and MA1 not quite reaching Rs. *Jasvia* differs from *Oedischia* in that the crossveins form a dense reticulation over most of the wing and with MP also unbranched. *Macroedischia* differs from *Jasvia* in having the precostal area larger, more pointed, crossveins not forming a dense apical reticulation and a larger anal area. *Metoedischia* has the forewing as in *Jasvia*, but broader, MA1 anastomosed with Rs over a longer distance and crossveins between branches of Rs nearly straight. *Paroedischia* is similar to *Metoedischia* but with the precostal area very long, a long Sc and crossveins not reticulate. *Permoedischia* has the precostal area more extensive than in *Oedischia* and MP unbranched. The forewing in *Plesioidischia* is wider near the middle than in *Oedischia* and crossveins reticulate in the region of Rs. *Sylvoedischia* has the forewing with a large precostal area, nearly as long as in *Macroedischia*, the costal veinlets connected by crossveins that are dense over most of the wing. The forewing of *Tettoedischia* is slender, with a large precostal area and costal veinlets not connected by crossveins. *Uraloedischia* has a long and narrow precostal area which extends about halfway to the origin of Rs and subcostal veinlets not reticulate. In *Afroedischia* the stem of M, forming the anterior boundary of the (median) cell, is initially concave when parallel to R; in the region of divergence from R, M becomes convex, but where connected by a distinct concave crossvein to CuA, the stem of MA+MP is clearly concave as is CuP. Venational features of *Afroedischia* are considered by us to be sufficiently distinct from the known generic descriptions to warrant the establishment of a new genus.

We thank the referees for constructive comments.

Received 17 July 1998. Accepted 5 January 1999.

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